Tables No. 1 and No. 2 were approximated from a curve showing the temperature on the central line of a wall of firebrick, in percentage value of the temperature of the surface of the brick, which was given on page 222, Appendix VII. The curve is based upon a flat wall. In applying this to brickwork built up to form square passes it is necessary to allow for the effect of the corners where a square column of brick is formed. As the ratio between the diagonal and the side of a square =1.41 = -\/2, the existence of such columns will double the heating time. These times are only approximate and would not apply to large passes with thin walls between, nor to small passes with thick walls.

Table No. 3 shows the relationship between the brick and the free area for different ratios of pass and wall thickness. As a general rule the stove is on gas from two to three times as long as it is on air. Therefore the cooling period Vvill determine the volume of the brickwork and the checker-pass volume required. Tests made by the Bureau of Mines (Bulletin No. 8, " The Flow of Heat Through Furnace Walls "); indicate a transfer drop in temperature from a hot gas to a brick wall of less than 150°. Numerous other data indicate a temperature drop in a gas-to-gas transfer of heat through checkerwork of 300°. This latter drop is less than that shown in the Cowpcr stove tested by Mr. Maccoun, where the blast temperature was 650° and the gas temperature around 1200°, a drop of 550.°

Table No. 4 consists of data abstracted from the test of a two-pass Cowper stove at the Edgar Thomson Furnaces in 1913 and contained in Mr. A. E. Maccoun's paper before the American Iron and Steel Institute on May 28, 1915, and the computations based upon these data.

The. combustion chamber has an area of 3 m^2 79

and a height above the burner of 23 m 10, giving a volume of 87 m^3 54. The gases in this chamber have a very high temperature, about 1220°. Assuming their specific weight to be equal to that of air, this temperature would be sufficient to give them an ascensional velocity of

$$^{1200} = \frac{1.29 - 1'29}{/\ 2gII} \text{—}^{r}\text{——} = 44 \text{ m } 70 \text{ per second,}$$